Cyber-Physical Systems, MS

Website (http://www.coe.neu.edu/degrees/ms-cse-iot/)

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The Master of Science in Cyber-Physical Systems with a concentration in the Internet of Things (IoT) prepares our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist, one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, infrastructure, to manufacturing.

This concentration integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and big data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

Degree Requirements

The program requires that a mix of core required courses and elective courses be taken—16 semester hours of core course work and a minimum of 16 semester hours of elective course work. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The core courses in data networks and/or concepts of object oriented design may be waived only if a student can demonstrate a satisfactory knowledge of either of these topic areas. The other two core courses may not be waived.

Special topics courses, as well as other courses not in the list of electives, may be used as electives with prior approval of the program director. A maximum of two courses from the Khoury College of Computer Sciences may be used as electives. Before taking any computer science course, prior approval is required from the program director.

Independent Study (CSYE 7978), usually 1 or 2 semester hours, or Software Engineering Project (CSYE 7945) in the Internet of Things must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for independent study or a software engineering project (IoT) need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (http://catalog.northeastern.edu/graduate/engineering/graduate-certificate-programs/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 10 semester hours in the fall and spring terms and 4 semester hours in each of the three summer terms. Any exceptions must be approved by the program director.

Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
CSYE 6510	Fundamentals of the Internet of Things	4
CSYE 6530	Connected Devices	4
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4

Electives

Code	Title	Hours
Complete four of the following. A maximum of 8 semester hours of nontechnical electives may be taken. Students may take elective course work outside these lists only with the prior approval of the program director. A maximum of 9 semester hours may be taken outside of the College of Engineering.		16
Technical Electives		
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7374	Special Topics in Computer Systems Engineering (Internet of Things)	
CSYE 7945	Software Engineering Project (Internet of Things)	
CSYE 7978	Independent Study (Internet of Things)	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 7390	Computer Hardware Security	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
INFO 6101	Data Science Engineering with Python	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 7290	Data Warehousing and Business Intelligence	
TELE 5360	Internet Protocols and Architecture	
Nontechnical Electives		

EMGT 5220	Engineering Project Management
INFO 6660	Business Ethics and Intellectual Property for Engineers

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required